Blue Springs Lake
1999 Water Quality Report

1. **General**.

a. **Project location**. The dam is located at river mile 4.6 on the East Fork of the Little Blue River. The project lies in Jackson County, Missouri, approximately 15 miles southeast of downtown Kansas City. The drainage area of the East Fork of the Little Blue River Basin is about 40 square miles. Blue Springs, along with the upstream reservoirs, Prairie Lee and Jacomo, control approximately 76% of this area or 32.8 square miles.

b. **Authorized project purposes**. Flood control, recreation, and fish and wildlife.

c. **Pertinent data**.

Pools	Surface Elevation (ft. above m.s.l.)	Current Capacity (1,000 A.F.)	Surface Area (acres)	Shoreline (miles)
Flood Control	820.3	15.8	982	
Multipurpose	802.0	10.8	722	12
Inactive		0.3 *		
Total		26.6		

Total Drainage Area: 32.8 sq. miles
Average Annual Inflow: 19,830 acre-feet

* Contained 25% in flood control pool, 75% in multipurpose pool.

2. **Activities and studies during the year**.

a. A water quality survey of Blue Springs Lake was conducted by PM-PR-W on June 1, 1999. *In situ* profiling of water temperature, dissolved oxygen (DO), conductivity, pH, and oxidation reduction potential (orp) or redox at one-meter intervals, field measurements of secchi and photic zone depths, and water collections from subsurface, photic zone, and near bottom strata were performed at three lake stations. Also, ambient measurements and surface water collections were carried out in the outlet. The PM-PR-W performed total suspended solids, turbidity, chlorophyll, fecal coliform, and immunoassay herbicide analyses. The Chemical and Materials Quality Assurance Laboratory

(CMQAL), Omaha, performed nitrogen and phosphorus group, iron, manganese, and gas chromatographic pesticide analyses.

In addition, a private contractor sampled the beaches once a week during the summer months for fecal coliform and E. coli. Sampling results were reviewed by the operating agency, the Jackson County Parks and Recreation Department (JCPRD).

3. **Existing conditions**.

Blue Springs Lake was very clear during the summer survey period, which was expected given its controlled inflow from Lake Jacomo (surface discharge directly to the up lake area). Only slight differences in turbidity and suspended solids were noted lake wide. Turbidity in the surface waters ranged from 3.6 to 7.7 NTU, and suspended solids ranged from 3.2 to 9.2 mg/L. The photic zone depth was moderately deep extending to 4.2 m down lake and to 1.8 m up lake.

The lake was well stratified with a 6.2^{o}C temperature differential between surface and bottom waters in the 9-m water column near the dam (BS-4). Dissolved oxygen concentrations, ranging from 9.0 mg/L in the surface waters to 0.1 mg/L in the bottom waters, also reflected the intensely stratified conditions. A thermocline and oxycline were present between 3 and 4 meters. Below 6 meters, DO concentrations were inadequate to support most aquatic life. Up-lake waters near the Woods Chapel Road Bridge (BS-11) exhibited a 5^{0}C differential in the 5-m water column. The DO concentrations ranged from 9.5 to 0.1 mg/L. Only the bottom 2 meters contained inadequate oxygen levels. Mid-lake waters (BS-9) exhibited similar conditions.

Elevated nutrient levels were again noted in the summer survey. Total phosphorus concentrations exceeded the generalized eutrophy criterion for lake waters of 0.05 mg/L, indicating sufficiently high levels were present to support algal blooms. Total phosphorus in the surface waters, where it is the most readily available for algal uptake, ranged from 0.05 mg/L uplake to 0.09 mg/L downlake.

Total nitrogen (ammonia, total Kjeldahl nitrogen, nitrite nitrogen, and nitrate nitrogen) concentrations were also elevated, but did not exceed the range of naturally expected values for lake waters. The highest total nitrogen concentration, 2.74 mg/L, was present in down lake, bottom waters. Total nitrogen in surface waters ranged from 0.78 mg/L up lake to 0.94 mg/L down lake.

Given the clear water conditions and the elevated nutrient concentrations, the algal response was not as high as would be expected. Chlorophyll

concentrations, which are an estimate of algal biomass, ranged from 0.8 to 19.1 ug/L. The mean lake concentration was 7.9 ug/L. This level of productivity lies well within a satisfactory water quality range.

Four herbicides (atrazine, metolachlor, cyanazine, and metribuzin) were present above detection limits in a scan of nine common herbicides. Only atrazine was present in any significant amounts in the summer survey. The maximum atrazine concentration noted was 0.51 ug/L, which is well below the established maximum contaminant level (MCL) of 3 ug/L. Past surveys have shown that herbicide concentrations decrease substantially from late spring/ early summer peaks within two to three months.

The outlet (BS-3) was well oxygenated (9.4 mg/L) during the June survey. Turbidity and suspended solids were low at 5.3 NTU and 8.8 mg/L, respectively. All other ambient parameters were within expected ranges.

4. **Future conditions**.

The water quality of Blue Springs Lake has been good to date. Potential problems include nutrient loading and hypolimnetic oxygen depletion during the summer. The high utilization level of the small metropolitan impoundment suggests that bacterial contamination will continue to be a concern at the swimming beach. Additionally, contamination by pesticides and other chemicals due to close urban proximity is a potential problem for the Project's designated uses.

5. **Recommendations**.

With the current PM-PR-W staffing and funding levels, water quality monitoring of Blue Springs will be limited to a single summer survey in 2000. Bacteriological analysis by an outside contractor will continue to be monitored by JCPRD. Sampling in response to specific emergency problems will be coordinated with the county agency.